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Impact of the NCC on NSTX-U edge ballooning stability, and the implications for edge transport[1] J.M. CANIK, ORNL, S.P. GERHARDT, J.E. MENARD, J.-K. PARK, PPPL — A new Non-axisymmetric Control Coil (NCC) set is being considered to augment various studies in NSTX-U involving applied 3D magnetic perturbations. These in-vessel, off-midplane coils offer a significantly broader spectral range, useful for studies of ELM control. The VMEC 3D equilibrium code and the COBRA stability code have been used to investigate the impact of the NCC on ideal ballooning stability. For axisymmetric cases that are stable but near the ballooning boundary, the NCC can strongly destabilize ballooning modes over a large range of plasma radius. Profile variations indicate that, compared to the axisymmetric case, the NCC causes the stability boundary to shift by $\sim$ 10-20% in both magnetic shear and pressure gradient. Viewed as a proxy for the kinetic ballooning mode, these results indicate that activating the NCC set may reduce the pressure gradient by a similar amount. The non-axisymmetry in the radial heat flux can be expected to produce divertor striations similar to those observed in various experiments. Comparisons of how the impact on stability varies with kink and resonant response will be presented.

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